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CONTENTS

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The Prevention of Maternal Death

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The death of the mother in childbirth is perhaps one of the greatest disasters which can occur in medicine, for it is she, above all, who is the pivot of the family group. Yet mothers die in pregnancy or childbirth all too frequently.

Any assessment of the position and any remedies to be taken depend upon accurate statistics, and in Malaya such statistics are almost impossible to obtain. Where the kampong policeman can sign the death certificate, and where permission for autopsy is rarely given, little accuracy in diagnosis can be expected.

Despite these drawbacks, maternal mortality studies have value and I propose to show our experience in the General Hospital, Kuala Lumpur, over the past four years. Kuala Lumpur is the Federal capital of Malaya and has a population of about 300,000. The hospital serves the town and acts as the "reference" hospital for the State of Selangor, covering in all about 1,000,000 people. The maternity department has 40 ante-natal, 85 post-natal and eight labour beds. These are far too few and accommodation problems are a constant worry. The inhabitants of the state are Chinese 52 per cent., Malay 40 per cent. and Indian 7 per cent.

Since the hospital acts as the central obstetric hospital for the state, a certain selection of patients has been made; for instance, we receive most of the cases of toxaemias of pregnancy diagnosed in Kuala Lumpur and, with the exception of Klang district hospital 25 miles away, do all the caesarean operations in Selangor.

Between 1st January, 1953, and 31st December, 1956, 20,596 women were delivered in the hospital and 102 mothers died. It is these deaths which form the basis of this communication.

Who Dies?

Analysis of the deaths shows that 44 were Chinese, 39 Indian and 16 Malay. The proportion of patients admitted was 48 per cent. Chinese, 46 per cent. Indian and 6 per cent. Malay. The reason for the high proportion of deaths of Malays is that the Malay woman prefers to deliver at home and will only come to hospital when seriously ill, whilst the women of the other two races prefer hospital to home delivery.

The risk of death occurring in various pregnancies is shown in Table I. It can be seen that the risk is greatest for women having their sixth or subsequent child, almost as great for primigravidae and considerably less for women having their second to fifth child.

Table I

To Show the Effect of Repeated Pregnancies Upon Maternal Mortality

	Deliveries	*Deaths*	*Rate per* 1,000
Primigravidae	4,706	27	5.7
Gravida 2—5	8,807	30	3.4
Gravida 6 +	7,042	46	6.5

The Role of Ante-Natal Care in the Prevention of Death

This is considerable. Since 1949 ante-natal clinics have been opened in many parts of the state as part of government policy. The effect of this policy can be gauged from Table II.

Table II

To Show the Effect of Attendance at Ante-Natal Clinic Upon Maternal Mortality

	Number	*Deaths*	*Rate per* 1,000
Admissions	20,596	102	4.9
Attended A.N. Clinic	16,117	33	2.04
No ante-natal care	4,479	69	15.40

Of the 20,596 women who delivered in hospital, 16,117 had attended an ante-natal clinic more or less regularly and the remaining 4,479 had never attended a clinic. Of those women who died, 33 had attended a clinic and 69 had not. Thus the risk of death is seven times greater if the patient has not attended an ante-natal clinic. Unfortunately the provision of clinics is not enough—the people must be educated to use them. It has been a common story amongst the critically ill to find that the woman had never attended a clinic, although there was one near her home, because she felt there was no need.

Principal "Environmental" Factors Associated with Maternal Death

This can be put another way. Table III, which is constructed in a manner similar to that employed by the British Ministry of Health, shows which "environmental" factor I considered most important in its effect upon the maternal death.

Table III

To Show the Effect of Certain "Environmental" Factors Upon Maternal Mortality

Non-obstetric	3
Non-preventable	13
Probably preventable—	
1. Lack of co-operation by the patient	39
2. Lack of obstetric care outside	23
3. Inadequacy of ante-natal care	2
4. Inadequacy of care in hospital	13
Unexplained—insufficient evidence	9
	102

Several interesting features emerge from this table. For instance, I considered 38 per cent. of the deaths to be due to a lack of co-operation on the part of the patient. Two examples will show what I mean.

10/54. The patient was an Indian married to a government servant and was the daughter of a government servant. She had a stable middle-class background and had been well educated. Despite this, she had never attended an ante-natal clinic, although living within half a mile of one, and was admitted to hospital with severe pre-eclampsia when 34 weeks pregnant. Her blood pressure was 170/110, the urine was solid with protein and she had gross oedema. She had noticed the oedema two weeks previously, but had ignored it, as had her mother, and three days before admission she had developed a severe headache and blurring of vision. She was sedated and a caesarean section was performed, as the toxaemia was deteriorating. A live premature child was born which survives. However, the mother developed anuria and her condition remained critical for 54 hours, when she died.

Had this patient attended an ante-natal clinic, the first signs of toxaemia would have been noted and treatment instituted.

13/56. An even more tragic case is that of a Chinese patient aged 22, a primigravida, who was admitted to hospital at the twenty-fourth week of pregnancy in heart failure. She responded rapidly to treatment, and after ten days in hospital was feeling so well that she took her own discharge, despite all our efforts and warnings. These were all too quickly fulfilled. She was admitted a week later in heart failure and in labour, and died three hours later.

The next largest group of environmental factors associated with maternal death is where obstetric intervention has been undertaken in improper circumstances and where warnings have been neglected.

12/53. The patient was admitted to hospital in severe shock after an attempted forceps delivery by a general practitioner. The cause of the failure to deliver by forceps was all too evident—the cervix was only three fingers dilated. However, the attempt proved fatal to the patient, for the cervix had been torn and the tear extended up into the lower uterine segment. The patient died before treatment could be undertaken.

Several similar stories are available, one occurring last year:

1/56. The patient was aged 39 and was pregnant for the ninth time. She was seen by a general practitioner at his surgery when she complained of painless bleeding. She was then 36 weeks pregnant. She was examined vaginally, and since this occasioned more bleeding, the vagina was plugged with cotton wool. She reached the hospital critically ill, the bleeding having continued above the pack, and died soon after.

The patient should have been sent to hospital without any vaginal examination, and certainly without having been packed. I have stressed this each year in the annual report of the department, but unfortunately bleeding patients are still examined vaginally in improper surroundings. It is too easy to criticise from the confines of a hospital, but had these women been treated properly it is probable that both would be alive to-day.

Our own unit is not without blame, as can be seen in Table III and as is shown by the following case history:

12/54. The patient was Indian, aged 25, and pregnant for the fourth time. She had attended the ante-natal clinic of the hospital regularly, and at the twenty-fourth week of pregnancy it was noted that the blood pressure had risen from 100/80 to 130/85 and that a trace of albumin had appeared in the urine. There was no oedema. She was told to report back in two weeks, but a week after her visit was admitted in eclampsia and, despite treatment, died of pontine haemorrhage. Had she been told to return one week after her last visit it is possible that the eclampsia might have been avoided. In mitigation, it can be said that the clinic was overcrowded, the staff overworked.

When reviewing the history of several other patients, I felt that had we taken certain measures death might have been avoided. In most there was an error of judgment, but unless one has time to reflect and to consider each problem slowly, such errors occur. In one case there were several factors involved; those due to the plan of the hospital, those due to a lack of reflection and those due to a shortage of staff.

20/55. The patient was Chinese, aged 46, gravida 8. She had not attended an ante-natal clinic and was admitted to a district hospital in labour. After 9½ hours' labour the cervix was fully dilated and the foetal head was "just engaged." At this stage inertia supervened and the doctor ordered pitocin. There was no change 12 hours later, and he attempted a forceps delivery, but failed. He then referred her to this hospital. On arrival, the patient was in fairly good condition. The baby, which was large, was alive

and the head was in the upper strait of the pelvis, only partially flexed. Under general anaesthesia forceps delivery was attempted in the labour ward, using Keillands forceps, but owing to disproportion failed. She was taken from the labour ward to the operation theatre by ambulance and a second anaesthetic was given. During the induction of this anaesthetic the patient vomited and regurgitated fluid into her lungs. A rapid caesarean section was performed, but a still-born child was delivered. The mother remained cyanosed during the operation and was returned to the ward an hour later. The pulse was rapid, but of good volume. The lungs showed rales in all areas, especially the lung bases. Two hours after her return to the ward the cyanosis deepened, the pulse volume became poor and the patient died four hours after operation. I considered at the time that three main factors influenced this death: (1) the delay in sending the patient to Kuala Lumpur; (2) the attempted forceps in the labour ward, not in the operation theatre, which meant that the patient had two anaesthetics; and (3) the vomiting during induction of anaesthesia.

THE CLINICAL CAUSE OF DEATH

In Table IV the maternal deaths have been classified by a modification of the International Code, which has been adopted by many maternal mortality committees in the United States of America. Although, as I have pointed out, autopsy is difficult to obtain in Malaya, the cause of death has been assessed clinically.

Table IV

TO SHOW THE CLINICAL CAUSE OF MATERNAL DEATH

A.	*Obstetric Causes*—	
	1. Toxaemia	23
	2. Antepartum haemorrhage	11
	3. Postpartum haemorrhage	11
	4. Neglected labour or trauma	17
	5. Vascular accidents (emboli, etc.)	4
	6. Infection	4
	7. Anaesthetic accidents	1
	8. Mismatched blood transfusion	1
	9. Undetermined	3
B.	*Non-Obstetric Causes*—	
	1. Anaemia	12
	2. Cardiac disease	3
	3. Vascular disease (intracranial haemorrhage)	6
	4. Hepatic disease	1
	5. Renal disease	3
C.	*Non-Related Causes*—	
	1. Infectious disease	1
	2. Malignancy	1

In certain patients more than one cause was operative. For instance, toxaemia was aggravated by anaemia, vascular disease by toxaemia, anaemia by haemorrhage.

It can be seen that the two major causes of death were the toxaemias of pregnancy and haemorrhage in pregnancy, childbirth or the puerperium. The latter has caused us much anxiety in recent years, and were it not for the availability of blood provided by donors of all races, we could expect a higher mortality from this cause. In some cases the haemorrhage has been associated with hypofibrinogenaemia.

2/56. The patient was Indian, aged 36, gravida 9. She did not attend an ante-natal clinic, and when admitted in the second stage of labour was seen to be severely anaemic (haemoglobin 3.8 g. per 100 ml.). She delivered 15 minutes after admission, but lost 30 to 40 ounces of blood. Although the uterus was contracted and no trauma was found in the genital tract, the ooze continued. The venous blood showed an absence of coagulation. Despite six pints of blood, she died twelve hours after delivery.

This was the last death due to hypofibrinogenaemia reported, for soon after this disaster we received supplies of dried plasma from the National Blood Transfusion Service of Great Britain.

Neglected labour or traumatic attempts at delivery accounted for 17 deaths, and anaemia for 12 more. In several other cases anaemia was a factor in the death, but in these 12 cases it was considered to be the most important of the clinical factors.

These four form the major groups of maternal death, for infection, so long a childbirth terror, has been controlled with the antibiotics and with modern methods of midwifery.

A CORRELATION BETWEEN "ENVIRONMENTAL" FACTORS AND THE CLINICAL CAUSE OF DEATH

In Table V the environmental factors associated with maternal mortality are related to the clinical cause of death. This is a most instructive table.

It is evident from this table that the severity of toxaemia of pregnancy could be diminished if the patient attended an ante-natal clinic, for no less than 20 out of 23 mothers who died had not attended a clinic. And it should be noted that some patients dying from intracranial haemorrhage had a pre-existing hypertension which was aggravated by pregnancy. Pregnancy also had a damaging effect upon the three patients who died of renal disease, and had these patients attended early enough, the pregnancy could have been terminated. Many of the deaths from antepartum haemorrhage and from postpartum haemorrhage could have been avoided if the obstetric care outside hospital had been adequate and if the hospital had had sufficient staff to maintain a "flying squad." An example of this is:

19/55. An Indian patient who was delivered at home by a private midwife. She was sent into hospital two hours after delivery, moribund. She had had a severe postpartum haemorrhage, the placenta was in the uterus and the abdominal wall was covered with the marks of fingernails and was bruised considerably.

Table V

To Show the "Environmental" Factors Influencing Death Related to the Clinical Cause of Maternal Death

	Non-obstetric	*Non-preventable*	*Lack of co-operation by the patient*	*Inadequacy of obstetric care outside hospital*	*Inadequacy of ante-natal care*	*Inadequacy of care in hospital*	*Unexplained—insufficient evidence*	*Total*
A. *Obstetric Causes*								
1. Toxaemia	—	—	20	1	2	—	—	23
2. Antepartum haemorrhage	—	1	2	5	—	3	—	11
3. Postpartum haemorrhage	—	—	1	8	—	2	—	11
4. Neglected labour, trauma	—	—	2	8	—	5	2	17
5. Vascular accidents	—	2	—	—	—	—	2	4
6. Infection	—	—	1	—	—	1	2	4
7. Anaesthetic accidents	—	—	—	—	—	1	—	1
8. Mismatched blood	—	—	—	—	—	1	—	1
9. Undetermined	—	—	1	—	—	—	2	3
B. *Non-Obstetric Causes*								
1. Anaemia	—	1	9	1	—	—	1	12
2. Cardiac disease	—	1	2	—	—	—	—	3
3. Vascular disease	1	4	1	—	—	—	—	6
4. Hepatic disease	—	1	—	—	—	—	—	1
5. Renal disease	—	3	—	—	—	—	—	3
C. *Non-Related Causes*								
1. Infectious disease	1	—	—	—	—	—	—	1
2. Malignancy	1	—	—	—	—	—	—	1
	3	13	39	23	2	13	9	102

The tragedies occurring in hospital could be reduced if sufficient staff were available and if there was sufficient time for reflection, for discussion and for consultation. Both this group of deaths and those occurring outside could be reduced if there was proper postgraduate training in obstetrics.

What Can be Done to Reduce Maternal Death?

These are the facts. If these facts are appreciated a plan can be formulated which would reduce the high maternal mortality which is found in Malaya; and the problems I have outlined are by no means peculiar to that country. In this plan certain provisions have to be made.

(1) The provision of ante-natal clinics and the education of women to use the facilities provided. Whilst the state can provide, and is providing, ante-natal clinics, it is up to the community leaders, the press and all educated people to show the poorer and more conservative members of the population that care during the ten months of pregnancy is as important as care during the ten hours of labour.

(2) The provision of properly designed. adequately equipped central obstetric hospitals. In such hospitals the operation theatre would be near to the labour ward and the blood bank and pathological laboratory near both. In all hospitals there should be sufficient ante-natal beds to admit all patients requiring treatment. and a suggested ratio is one ante-natal bed to four post-natal beds.

(3) The provision of medical staff in sufficient numbers for teaching and research to be conducted as well as routine ward work. In this context, during the period covered by this communication, the department of obstetrics of the general hospital was staffed by myself, a registrar and a house surgeon. The last was changed every six months and had had no postgraduate training in obstetrics when he joined the unit. We were all over-worked, and when you are over-worked you cannot consider a problem calmly and dispassionately. This year there has been some improvement and, with the addition of two "interns," I have started postgraduate clinical teaching. I hope that after six months with the unit the doctor will have some idea of his capabilities; but, more important, will have some knowledge of his limitations.

(4) The provision of facilities for all practitioners who intend to deal with the pregnant women to spend at least six months after graduation in a busy obstetric unit, and if possible have "refresher courses" from time to time. This has been recommended in England by the Royal College of Obstetricians and Gynaecologists, and there is no doubt that it has done much to improve the standard of obstetrics in that country. Such a measure would also improve the standard in Malaya.

(5) The provision of permanent senior trained nursing staff in the larger obstetric units and the intensive training of midwives to work in the hospitals, the towns, the new villages and the rural areas. The importance of sufficient permanent trained nursing staff is evident; in obstetrics the doctor and nurse act as a team, their co-operation is essential and can only be realised fully if there is permanence.

(6) Finally, there is the question of the provision of family planning on a large scale. Despite the controversy it engenders, there is no doubt that family planning would reduce maternal deaths, for frequent repeated childbearing is hazardous to the mother.

These provisions must be implemented in co-ordination of course. For instance, even if a woman does not attend a clinic and develops severe pre-eclampsia, her chances of survival are better if she is seen by a general practitioner trained in obstetrics, is at once admitted to a hospital where all facilities are available and where there are highly trained doctors. Similarly, the patient admitted in neglected labour need not die if the doctors are alert to the dangers of electrolyte imbalance and deyhdration, and if competent anaesthetists are available to give an anaesthetic for a difficult obstetric operation.

To some extent we have started to fulfil many of these provisions in the General Hospital, Kuala Lumpur, and the fall of maternal mortality is shown in Table VI.

Table VI

To Show the Maternal Mortality of Patients Delivered in the General Hospital, Kuala Lumpur

Year	*Rate per* 1,000 *births*
1953	7.0
1954	5.0
1955	4.7
1956	3.75
1957 (August)	2.5

Up to August this year the maternal mortality had fallen to 2.5 per 1,000 births. These results have been obtained despite increasing admissions and the acceptance of patients from an ever-widening area.

How far Malayan experience can be related to conditions in Rhodesia I do not know, but I think that many parallels could be found.